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Witamin D in children population - benefits and threats

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ABSTRACT

Introduction

Nowadays, it has become fashionable to use dietary supplements containing large doses of vitamin D available without a prescription. In the case of children, dietary supplementation with a properly selected dose of vitamin D is extremely important and brings many benefits, of which it is important to prevent rickets in the pediatric population, attention is also drawn to its toxicity and consequences in the event of an overdose of vitamin D preparations, to which infants and young children are most exposed, examples of risks are hypercalcemia, hypercalciuria and nephrocalcinosis.

The aim of the study

Showing the benefits and dangers of vitamin D supplementation.

Material and methods

The research was conducted using PubMed articles and on: vitamin D supplementation in children, vitamin D overdose, vitamin D deficiency.

Description of the state of knowledge

Vitamin D is the generic name for ergocalciferol and cholecalciferol that we can find in foods, however, food and supplementation are not its only sources, it should be borne in mind that it is possible to synthesize vitamin D in the skin after exposure to ultraviolet reproduction (UV-B). The concentration of 25(OH)D in childhood serum is influenced by the amount and frequency of vitamin D consumed, sun exposure, body weight and body fat levels. The main risk of vitamin D deficiency in children is rickets and deformation of the osteoarticular system and metabolic disorders, and long-term use of its high doses can lead to hypercalcemia and nephrocalcinosis.

Summary

It is very important to educate parents about the importance of vitamin D supplementation in a dose properly selected for the newborn along with an explanation of the possible consequences of deficiency, as well as overdose.

Key words: supplementation vitamin D in children, hypercalcemia, rickets in children, vitamin D deficiency.

Introduction

Vitamin D deficiency is a global health problem that affects more than one billion children and adults worldwide. There is a link between vitamin D deficiency and countless acute and chronic diseases, including preeclampsia, tooth decay in children, periodontitis, autoimmune disorders, infectious diseases, cardiovascular disease, fatal cancers, type 2 diabetes, and neurological disorders[1]. Vitamin D deficiency in children will cause growth retardation and classic signs and symptoms of rickets. In adults, vitamin D deficiency accelerates and exacerbates both osteopenia and osteoporosis and increases the risk of fractures. In addition, vitamin D deficiency is also associated with muscle weakness[2]. There is currently no exact agreement on determining vitamin D deficiency. Many experts believe that a level of 25 (OH) D less than 50 nmol / L corresponds to a deficiency of vitamin D, while a concentration between 50 and 75 nmol / L corresponds to the insufficiency of vitamin D. These definitions are mainly based on the musculoskeletal action of vitamin D[3]. The main source of vitamin D for most people is exposure to sunlight[4,5]. Few foods naturally contain vitamin D, including fatty fish such as salmon, mackerel and herring, and fish oils. Vitamin D is metabolized in the liver to 25(OH)D, and then in the kidneys to 1.25(OH)₂D[5,6]. In many studies, 1.25(OH)₂D₃ has been shown to inhibit the growth of cancer cells, induce apoptosis and reduce angiogenesis[8], in addition, 1.25(OH)₂D inhibits renin production in the kidneys and has immunomodulatory effects on monocytes and activated T and B lymphocytes [9]. When determining the dose and supplementation of this substance, it is also necessary to take into account the consequences of excessive administration of the vitamin in the diet, which may lead to hypercalcemia, hypercalcuria or nephrocalcinosis[10,11].

The aim of the study

To show how important and what benefits is the supplementation of a properly selected dose of vitamin D among children and what are the consequences and risks of using too much vitamin D.

Material and methods

The research was done using PubMed and Google Scholar articles about the topic of: supplementation vitamin D in children, vitamin D overdose, hypercalcemia, rickets, vitamin D deficiency.

Description of the state of knowledge

The term "supplementation" has been used in the context of cholecalciferol, ergocalciferol, calcidiol and calcitriol. In nature, by far the main form of vitamin D that nourishes the body is cholecalciferol. In contrast, ergocalciferol is primarily a synthetic and less stable product[12]. Vitamin D plays an important immune role through the production of antimicrobial peptides – for example, cathelicidins. Vitamin D is important in the airways, skin, and potentially gut health[13]. Among newborns and infants, regardless of the method of feeding, vitamin D supplementation is recommended from the first days of life[14]. The use of appropriate supplementation prevents the formation of mild and severe deficiencies, and then the consequences of severe deficiencies, so it is important to adjust the dose of supplementation to the age of the child, body weight, body fat level as well as the season. In the period from birth to 6 months of age, among breastfed infants, a dose of 400 IU / day should be supplemented, and with modified food they should receive a dose of 400 IU / day including diet and supplements[15]. Between 6 and 12 months of age, a dose of 400-600 IU/day. Children and young adults should dose vitamin D between 600-1000 IU/day depending on body weight, obese adolescents should increase supplementation to 1200-2000 IU/day[14].. When choosing a dose, however, attention should be paid to the fact that vitamin D is deposited in adipose tissue, due to which hypercalcemia can be permanent, which leads to complications such as nephrocalcinosis. Characteristic laboratory results of vitamin D poisoning are high serum calcium levels causing hypercalciuria, low PTH and high levels of 25 [OH] D [15]. Hypercalcaemia therapy has been introduced in all our patients in the form of

hydration, oral prednisolone, a low-Ca diet and vitamin D withdrawal. Another effective method is the use of bisphosphonates, especially pamidronate, which has bone resorption via osteoclasts, causing a sharp reduction in serum calcium, even if hydration and prednisolone treatment has not had a significant effect[16].

Summary

It is important to be aware of the benefits of vitamin D supplementation among the pediatric population, which includes reducing the risk of osteoarticular diseases that reduce a wide variety of acute and chronic diseases that include pathologies within the teeth, infectious, immune, neoplastic or metabolic diseases. However, one should also remember about the risk of excessive consumption of products that increase the level of vitamin D in the serum, mainly through excessive supplementation. The negative consequences of pre-infectious conditions are abdominal pain, lack of appetite, nausea and vomiting, excessive sweating, or more seriously significant increased calcium levels in the blood, which can lead to calcification of organs, mainly kidneys, and thus impaired function. Particular attention is paid to the increased amount of vitamin D in the serum in pregnant women, which can interfere with the proper growth and development of the fetus. It is necessary to increase awareness of the seriousness of the problem among doctors who prescribe vitamin D for the wrong reasons, Vitamin D should be prescribed for suspicious rickets only after proper examination. It is also important that pediatricians and family doctors make parents aware of the importance of vitamin D supplementation in children, while educating them about the symptoms and consequences of overdose and the need to monitor the amount of supplements taken[16].

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